WE CLAIM:

1. A method for isolating and immobilizing at least one bioparticle of interest on an active electronic matrix chip device (wherein the device comprises: a substrate, individually addressable electrodes on the substrate, and a permeation layer overlying a plurality of the electrodes on the substrate, further wherein portions of the permeation layer over the electrodes form microlocations of the active electronic matrix chip device, further wherein at least one capture immunoreagent specific for the bioparticle of interest is attached to the permeation layer of the device at or between a plurality of microlocations), the method comprising:

   a) introducing onto the active electronic matrix device a sample solution containing the bioparticle of interest, wherein the sample solution is of a conductivity suitable for dielectrophoretic isolation of the bioparticle of interest;

   b) passing an alternating current through selected electrodes on the active electronic matrix chip device, wherein the electrodes are selected to produce areas of high alternating current field strength and low alternating current field strength at predetermined positions on the active electronic matrix chip device, wherein the alternating current is supplied at a suitable voltage and frequency for dielectrophoretic isolation of the bioparticle of interest, and further wherein the capture immunoreagent specific for the bioparticle of interest are located at one or more predetermined positions of alternating current field strength at which the bioparticle of interest is predicted to aggregate; and

   c) maintaining the alternating current in (b) for a sufficient length of time to allow the capture immunoreagent to bind to the bioparticle of interest, thereby immobilizing the bioparticle.

2. The method of claim 1 further comprising washing the permeation layer surface of the active electronic matrix chip device to remove undesired components of the sample solution mixture after step (c).

3. The method of claim 1 wherein the bioparticle of interest is detectably labeled.

4. The method of claim 3 wherein the bioparticle of interest is detectably labeled in an additional passive immunolabeling step comprising introducing onto the active electronic matrix chip device a solution comprising a detection immunoreagent specific for the bioparticle of interest, and incubating the solution on the chip for a sufficient time to allow the detection immunoreagent to bind to the bioparticle of interest.

5. The method of claim 3 further comprising a detection step wherein the presence or absence of the detectably labeled bioparticle is detected at one or more predetermined positions.

6. The method of claim 1 wherein the predetermined positions at which the bioparticle of interest is predicted to aggregate are at "aggregate" microlocations of the active electronic matrix device, wherein the capture immunoreagent is attached at the aggregate microlocations.

7. The method of claim 6 further comprising the steps of:

d) introducing onto the active electronic matrix chip device a solution comprising a detection immunoreagent specific for the bioparticle of interest;

e) passing a direct current through one or more aggregate microlocations, wherein the electrodes under the aggregate microlocations are biased so as to attract the detection immunoreagent to the aggregate microlocations from the solution; and

f) maintaining the direct current in (e) for a sufficient time to allow the detection immunoreagent to bind to the bioparticle of interest at the aggregate microlocation.

8. The method of claim 7 further comprising a detection step wherein the presence or absence of the detection immunoreagent is detected at one or more aggregate microlocations.

9. A method for isolating and detectably labeling at least one bioparticle of interest on an active electronic matrix chip device (wherein the device comprises: a substrate, individually addressable electrodes on the substrate, and a permeation layer overlying a plurality of the electrodes on the substrate, further wherein portions of the

permeation layer over the electrodes form microlocations of the active electronic matrix chip device), the method comprising:

a) introducing onto the active electronic matrix device a sample solution containing the bioparticle of interest, wherein the sample solution is of a conductivity suitable for dielectrophoretic isolation of the bioparticle of interest;

b) passing an alternating current through selected electrodes on the active electronic matrix chip device, wherein the electrodes are selected to produce areas of high alternating current field strength and low alternating current field strength at predetermined positions on the active electronic matrix chip device, wherein the alternating current is supplied at a suitable voltage and frequency for dielectrophoretic isolation of the bioparticle of interest, and further wherein one or more predetermined positions of alternating current field strength at which the bioparticle of interest is predicted to aggregate are at one or more "aggregate" microlocations of the active electronic matrix chip device;

c) maintaining the alternating current in (b) for a sufficient length of time to allow the bioparticle of interest to aggregate at the aggregate microlocations;

d) introducing onto the active electronic matrix chip device a solution comprising a detection immunoreagent specific for the bioparticle of interest;

e) passing a direct current through one or more aggregate microlocations, wherein the electrodes under the aggregate microlocations are biased so as to attract the detection immunoreagent to the aggregate microlocations from the solution; and

f) maintaining the direct current in (e) for a sufficient time to allow the detection immunoreagent to bind to the bioparticle of interest at the aggregate microlocation, thereby detectably labeling the bioparticle.

10. The method of claim 9 further comprising washing the permeation layer surface of the active electronic matrix chip device to remove undesired components of the sample solution mixture after step (c).

11. The method of claim 9 further comprising a detection step wherein the presence or absence of the detection immunoreagent is detected at one or more aggregate microlocations.

12. The method of claim 11 further comprising a washing step to remove unbound detection immunoreagent from the active electronic matrix chip device prior to the detecting step.

13. The method of claim 9 wherein at least one capture immunoreagent specific for the bioparticle of interest is attached to the permeation layer of the device at the aggregate microlocations, further wherein the alternating current in step (b) is maintained for a sufficient length of time to allow the capture immunoreagent to bind to the bioparticle of interest.

14. The method of claim 9 wherein the bioparticle of interest adheres to the permeation layer of the aggregate microlocations due to the inherent physical or chemical properties of the bioparticle.

15. A method for isolating and immobilizing at least one sub-cellular constituent of a cellular bioparticle of interest in a system comprising one or more fluidly connected active electronic matrix chip devices (wherein each device comprises: a substrate, individually addressable electrodes on the substrate, and a permeation layer overlying a plurality of the electrodes on the substrate, further wherein portions of the permeation layer over the electrodes form microlocations of the active electronic matrix chip device), the method comprising:

a) introducing into the system a sample solution containing the cellular bioparticle of interest, wherein the sample solution is of a conductivity suitable for dielectrophoretic isolation of the cellular bioparticle of interest;

b) passing an alternating current through selected electrodes on an active electronic matrix chip device in the system, wherein the electrodes are selected to produce areas of high alternating current field strength and low alternating current field strength at predetermined positions on the active electronic matrix chip device, wherein the alternating current is supplied at a suitable voltage and frequency for dielectrophoretic isolation of the cellular bioparticle of interest;

c) maintaining the alternating current in (b) for a sufficient length of time to allow the cellular bioparticle of interest to aggregate at the predetermined positions;

d) electronically lysing the aggregated cellular bioparticle of interest to release one or more sub-cellular constituents of interest from the cellular bioparticle;

e) passing a direct current through one or more "capture" microlocations on one of the devices in the system, wherein the electrodes under the capture microlocations are biased so as to attract at least one sub-cellular constituent of interest to the capture microlocations, further wherein at least one capture immunoreagent specific for the sub-cellular constituent of interest is attached at the capture microlocations; and

f) maintaining the direct current in (e) for a sufficient time to allow the capture immunoreagent to bind to the sub-cellular constituent of interest at the capture microlocation, thereby immobilizing the sub-cellular constituent.

16. The method of claim 15 wherein the sub-cellular constituent of interest is selected from the group consisting of: proteins, proteoglycans, glycoproteins, glycosides, supramolecular complexes, and organelles or organelle fragments.

17. The method of claim 15 wherein the sub-cellular constiutuent of interest is detectably labeled.

18. The method of claim 17 wherein the sub-cellular constituent of interest is detectably labeled in an additional passive immunolabeling step comprising introducing onto the active electronic matrix chip device a solution comprising a detection immunoreagent specific for the sub-cellular constituent of interest, and incubating the solution on the chip for a sufficient time to allow the detection immunoreagent to bind to the sub-cellular constituent of interest.

19. The method of claim 17, wherein the sub-cellular constituent of interest is detectably labeled by the additional steps of:

d) introducing onto the active electronic matrix chip device a solution comprising a detection immunoreagent specific for the sub-cellular constituent of interest;

e) passing a direct current through one or more capture microlocations, wherein the electrodes under the capture microlocations are biased so as to attract the detection immunoreagent to the capture microlocations from the solution; and

f) maintaining the direct current in (e) for a sufficient time to allow the detection immunoreagent to bind to the cellular constituents of interest at the capture microlocations.

20. The method of claim 17 further comprising a detection step wherein the presence or absence of the detectably labeled bioparticle is detected at one or more predetermined positions.

21. The method of claim 16 further comprising washing the permeation layer surface of the active electronic matrix chip device to remove undesired components of the sample solution mixture after step (c).